

NOTES - FACTORING

Think of factoring as the opposite of distributing. It's a way to undo distributing in order to change the primary structure from a sum or difference into a product.

I. Factoring Using the GCF

GCF = Greatest Common Factor

The biggest number (and/or variables) that is a factor of / multiplies into every piece

Example: The GCF of 30 and 20 is 10

Factor trees

$$\begin{array}{c} 10 \swarrow 3 \\ \downarrow \\ 2 \cdot 5 \end{array} \quad \begin{array}{c} 4 \swarrow 5 \\ \downarrow \\ 2 \cdot 2 \end{array}$$

List factors 1, 2, 3, 5, 6, 10, 15, 30
1, 2, 4, 5, 10, 20

To Factor Using the GCF

1. Find the GCF
2. Divide/pull out the GCF from each piece
Answer will look like GCF (left + overs)
- (3. Check your work by distributing)

Example 1: Factor $4x^2 + 10x$

$\begin{array}{c} 2 \swarrow 2 \cdot x \cdot 2 \cdot 5 \\ \downarrow \downarrow \downarrow \downarrow \end{array}$ GCF = $2x$

$$2x(2x + 5)$$

Example 2: Factor $10x^3y - 5x^2y^2 + 25xy^3$

$\begin{array}{c} 2 \cdot 5 \cdot x \cdot x \cdot x \cdot y \\ 5 \cdot x \cdot x \cdot y \cdot y \\ 5 \cdot 5 \cdot x \cdot y \cdot y \cdot y \end{array}$ GCF = $5xy$

$$5xy(2x^2 - xy + 5y^2)$$

Example 3: Using factoring to simplify $\frac{12ab^2 - 40a^2b}{4ab} = \frac{\cancel{4ab}(3b - 10a)}{\cancel{4ab}} = (3b - 10a)$

Example 4: Simplify $\frac{2x^2 - 10x}{12x^2 - 60x} = \frac{2x(\cancel{x-5})}{12x(\cancel{x-5})} = \frac{2}{12} = \left(\frac{1}{6}\right)$